The Seybold Report
ISSN 1533-9211
DOI 10.5281/zenodo.6827381

GUIDELINES FOR COMPETENCE DEVELOPMENT OF SCIENTISTS ANDTECHNOLOGISTS TO SUPPORT THE GROWTH OF THE INDUSTRIAL SECTOR

AMNAT TAKSIN[1*], SUNEE WATTANAKOMOL[2]and THANIN SILPCHARU[3]

[1*] D.B.A. Candidate in Industrial Business Administration, Faculty of Business Administration, King Mongkut's University of Technology North Bangkok, Thailand. Email: s5914011950133@kmutnb.ac.th, amnart28taksin@gmail.com
[2] Associate Professor in the Faculty of Business Administration, King Mongkut's University of Technology North Bangkok, Thailand. Email: sunee.w@fba.kmutnb.ac.th
[3] Professor in the Faculty of Business Administration, King Mongkut's University of Technology North Bangkok, Thailand. Email: tanin@fbakm.com

Abstract

This study aimed to investigate guidelines for competence development of scientists and technologists to support the growth of the industrial sector and to develop a structural equation model of such guidelines. Questionnaires were used to collect the quantitative data from 500 executives or HR managers in industrial businesses whose productivity and manpower had been upgraded. Descriptive, inferential, and multivariate statistics were used to analyse the data.The findings revealed that guidelines for competence development of scientists and technologists to support the growth of the industrial sector comprised 4 elements:Creating paths for growth and advancement in the careers of corporate scientists and technologists in Skills transformation component, Disseminating reputation and professional values to be visible in society in Professional ethics component, not doing anything that may disgrace the honor and dignity of the profession in Perspective wisdom component, and Setting goals and encouraging innovation in daily work in Innovation Creation component , respectively , at the statistical significance level of 0.05.The analysis of the developed structural equation model revealed that it passed the assessment criteria and was consistent with the empirical data.

Keywords: competence development, scientists and technologists, industrial sector

INTRODUCTION

Currently, Thailand has a main approach to drive the country towards a "stability, prosperous, sustainable" country in accordance with the Government's vision for Thailand 2032, which requires knowledge base and innovation as key factors in creating value in social and economic in which regional and global competition and the transformation of the economic system into the economy Technology base and knowledge economy causing Thailand to increase the country's performance. The measure of the country's performance is measured from economic growth, job creation and competitiveness. This is a result of five elements: 1) macroeconomic and governance component, 2) education and training system component, 3) communications infrastructure component, 4) product marketing condition component, and 5) product marketing condition component factor market. In addition to these conditions, an important factor is also required, namely the capability of the country's innovation system. This is a result of the country's innovation system that is directly linked and related to

The Seybold Report
ISSN 1533-9211
DOI 10.5281/zenodo.6827381

knowledge base building, knowledge dissemination and use of knowledge. The flow of knowledge that occurs in the scientific system or other research organizations (theoretical knowledge) and most importantly in the company and its network (Practical knowledge) increasing industry knowledge is therefore important to enhance the country's innovation system capability while the knowledge creation process knowledge dissemination and use of knowledge. Knowledge flow in the industrial sector is necessary to develop and is able to respond to the development of personnel in research and innovation in the organization in a systematic way, that is, at the production level, processes that lead to high productivity are required by cost control, low cost, and delivery quickly and on time.

The issues in industrial business development, there is empirical data from each country's global competitiveness rankings. By the IMD International Institute for Management, a survey from 2017 to 2021 found that Thailand's talent ranking was downgraded. The factors of efficiency and competence in science, technology, knowledge indicators, especially training and education in Thailand was ranked 56th out of 64 countries, which did not meet the target set by Thailand. Factors reflecting the country's competitiveness consisted of several factors. But one of the key factors is efficiency and scientific competence. Digital technology, as can be seen from all indicators of a country's performance, these indicators will always be present. Therefore, innovation drives must be accelerated in the following areas: 1) increasing the number of innovation-based entrepreneurs; have potential 2) Developing innovation potential for entrepreneurs 3) Improving rules, regulations and obstacle measures 4) Developing international cooperation to link knowledge and investment 5) Utilizing the infrastructure technology and innovation; 6) the distribution of innovation opportunities across the region; and 7) preparing for the changing innovation system and when comparing the results of Thailand's competitiveness ranking with other countries in science and technology.

With all the importance and problems mentioned above, therefore, the researcher has an idea to study the guidelines for the development of competence in scientists and technology and technology to support the growth of industrial businesses, which can be considered that scientists and technology are personnel that are important to the development of every country around the world no less than other professions and especially in terms of infrastructure and scientific intensity to be ranked higher to be on par with developed countries in the end.

REVIEW LITERATURE

A study of Guidelines for Competence Development of Scientists and Technologists to Support the Growth of the Industrial Sector, the development of personnel is a process that helps employees in the organization to acquire knowledge, skills and appropriate behaviors that will increase the potential and ability of personnel to work in accordance with the needs of the job and the needs of the customers (Mannucci, Orazi, & de Valck, 2021). Therefore, human resourse development is an important mechanism that will help people have competence in producing products or services that meet customer needs. It also promotes the

The Seybold Report
ISSN 1533-9211
DOI 10.5281/zenodo.6827381

retention of personnel who have the potential to work with the organization in the long term, methods for developing skills and knowledge to lead to good performance (Noe, Hollenbeck, & Gerhart, 2021).

The development of human resource competency can be divided into the following parts

1. **Formal Education**

Educating employees by providing formal education courses or programs to improve their knowledge, skills, experience and work integrity. This may be organized in the form of training by the organization's human resource management department or courses organized by organizations providing training services. The education model can be managed in many forms, such as training, academic seminars, workshop, online education (Noe, Hollenbeck, & Gerhart, 2021), as well as the development of workforce skills by designing effective learning content to promote career advancement, earning an increase in salary (Brown, 2018).

2**. Job Experience**

Creating work experience is an activity to develop skills, knowledge and experience, focusing on personnel to learn to face challenges in solving various problems and to help develop personnel to learn and encourage personnel to check or examine the effectiveness of one's own performance from empirical practice (Kampkötter, Harbring, &Sliwka, 2018). The most popular methods of enhancing work experience include job enlargement, job rotation, transfer, promotions. Increasing work experience in this way affects career planning and encourages work motivation and encourages learning to enhance the skills, knowledge and experience of employees in the future (Park, Lim, & Lee, 2021).

For the development of competence in science and technology often develop skills, knowledge of creation to innovation from research and development processes in the form of systematic processes leading to the discovery of new knowledge. It focuses on and involves utilizing traditional science in parallel with modern science and technology to lead the production of new products. Innovation development often begins with the process of innovation. It starts from the development of basic research and further development (Leedy& Ormrod, 2019) until it becomes a product (building new knowledge) and applied research (Troubleshooting) (Enmozhi, Raja, Sebastine, & Joseph, 2021) will be noticeably different, but we can connect creative processes and innovation management (Gilbert, Bobadilla, Gastaldi, Boulaire, &Lelebina, 2018).

3**. Interpersonal Relationships**

In order to develop personnel for knowledge, it can be done onJob skills by fostering relationships between people in an organization with higher experience and expertise can be achieved in two ways: Mentoring and Coaching.

3.1 The mentoring system is used as a tool for knowledge development. Skills that affect career success (Giraud, Bernard, &Trinchera, 2019) as a form of knowledge transfer between more experienced and less experienced colleagues, to make sure knowledge remains in the organization all the time. The best way to transfer knowledge is when one person talks to one

The Seybold Report
ISSN 1533-9211
DOI 10.5281/zenodo.6827381

another. The mentoring system has proven to be highly effective and has been very popular over the years to be a good way to develop the potential of personnel in the organization because the mentoring system is a form of knowledge exchange with the fundamental aim of creating informal interactions between the mentor and the coached staff (Goldhaber, Krieg, & Theobald, 2020).3.2 Coaching is another tool for bosses, managers and leaders with more experience and longer practice ability to extract potential and efficiency from their subordinates as well as being able to develop the ability of the team to perform tasks according to the goals of the organization. This is one of the most important roles played by team leaders and supervisors in Performance Management (Terblanche, 2021).

In addition to the development of knowledge, ideas, skills and experience that will lead to the desirable performance of industrial business organizations. The essential and necessary in the competence of personnel, especially scientists and technology to support the growth of the industrial business sector, is a career ethics. Professionals in technical occupations and education in labor are taking note of important labor issues, which work ethic. It can be considered as important as adding techniques to enhance leadership formation and innovation development to support corporate sustainability in the near future (Rojewski and Hill, 2017). Suneeand Thanin(2017) studied structural equation modeling of anti-corruption guidelines in industrial business organizations, andthe results of the study revealed that anti-corruption guidelines in industrial business organizations consist of 4 aspects, namely, moral instillation; internal control internal audit and penalties

RESEARCH OBJECTIVES

1. To examine the components of the guidelines for competence development of scientists and technology to support the growth of the industrial business sector.

2. To develop a structural equation model, guidelines for competence development of scientists and technology to support the growth of the industrial business sector.

RESEARCH METHODOLOGY

Step 1: Qualitative Research uses In-Depth Interview Technique. The population used in research on the approach to developing the competency of scientists to support the growth of the industrial sector. As for this qualitative research, there are 9 key informants, divided into 3 groups: 3 sector operators, 3 government agencies and related agencies and a group of 3 scholars with the scope and issues studied in 4 elements, namely, skill transformation component, Perspective Wisdom, Innovation Creations, and Professional Ethics (Professional Ethics)

Step 2 Tools used in this research: The researcher created a questionnaire, which is divided into 8 steps in order as follows:

> **Step** 1:Study the principles of questionnaire construction to be used in research and to create a research conceptual framework.

The Seybold Report
ISSN 1533-9211
DOI 10.5281/zenodo.6827381

Step 2:Study information from books, documents, articles and related research results, including the results of in-depth interviews from 9 Key Informants as a guideline for creating questionnaires (Item) of the questionnaire.

Step 3:Determine the point and scope of the questions according to the objectives and the benefits of research

Step 4**:** Proceed to create a draft questionnaire.

Step 5:The researcher takes the draft questionnaire along with the assessment form and sends it to the experts who are knowledgeable and direct experience with the research topic, 5 persons to assess the quality of the questionnaire by calculating the consistency index between the question and the content or research objective (Item-Objective Congruence: IOC) The results of the analysis of the Conformity Index or IOC values between the questions and the objectives of this research. It appears that the IOC value is between 0.60 and 1.00.

Step 6**:** The researcher took the revised draft questionnaire according to the advice of experts and approved by the research advisor. Then, try out on a population that is similar to the population of this research but not the same population as the 30 studies, which is the accepted sample size in the trial (Thanin, 2020).

Step 7**:** The researcher took the draft questionnaire that was used to conduct the experiment (Tryout) and analyzed the discriminant power in the part of the multiple choice questionnaire. Checklist was used to analyze Standard Deviation (S.D.) with the value between 0.57 to 0.98 and in the part of the question that is a scale of estimates (Rating Scale), using Corrected Item-Total Correlation method, with values between 0.44 and 0.88 for sentiment analysis (Reliability) of the whole questionnaire, only in the part of the question that is in the form of Rating Scales, using the method of calculating the Alpha Coefficient of Cronbach (Cronbach) was equal to 0.98.

Step 8:Modify the questionnaire so that it meets the criteria set before the actual data collection.

Step 3:Group Chat: To certify a model for the development of scientific and technological competence to support the growth of the industrial sector by 11 qualified persons.

The observed variables were used to study the principle of improvement of the structural equation modeling for a total of 25 variables in each aspect of the components as follows:

Skill Transformation components consist of 6 observed variables:

1) Critical Innovation Assignment Variables and Build a Progress Tracking System (SK18)

2) Knowledge Partner Variable between employees in the organization to help each other practice new operational skills (SK3)

3) Incentive variables for developing science and technology knowledge and skills (SK17)

The Seybold Report
ISSN 1533-9211
DOI 10.5281/zenodo.6827381

4) Existing skills processing variables to create human resource development plans for modern science and technology skills (SK9)

5) Variables organize activities or projects for scientists and technologists to conduct new experiments and research (SK14).

6) Personnel strengths and weaknesses analyzed variables to provide guidelines for the development of necessary science and technology skills (SK1).

Perspective Wisdom Components consist of 7 observed variables:

1) The variables bring knowledge arising from personnel operations to create a manual for specific operations of the organization (WS20).

2) The variable invites experts in science and technology to criticize the methods of building prior knowledge in order to create new knowledge (WS15).

3) Supporting variables for personnel's work to be registered for intellectual property to promote new knowledge (WS22)

4) The request for cooperation with government agencies to promote and support innovation in science and technology (WS1)

5) Variables learn how to create knowledge from community sages to apply them to knowledge of science and technology (WS9).

6) Variables for the development framework of scientists according to the model of the Federation of Sciences and Technology Professionals to develop new knowledge landscapes for personnel (WS13)

7) The variables define the knowledge framework of scientists and technology that require flexibility. Adaptable according to the situation (WS7)

Innovation Creations Components consist of 6 observed variables:

1) Variables allow access to prototype innovation sources for personnel to dare to think. Take risks and have a true entrepreneurial mindset (IC17)

2) Initiative variables for small innovation projects first and expanding opportunities for personnel to have the opportunity to do new things (IC19)

3) The allocation variable for the proportion of the regular workload and the special projects in innovation management assigned by the executives (IC21).

4) The application of technological advances in educational variables to assist in the development of knowledge and innovation of scientists and technology (IC14).

5) Innovation method variables must be agreed upon and driven by the top management (IC10).

The Seybold Report
ISSN 1533-9211
DOI 10.5281/zenodo.6827381

6) Study variables of modern technology and apply them in the organization to help expand the potential of creativity (IC3)

Professional Ethics Components consist of 6 observed variables:

1) The Company maintains confidential information and does not use the information for personal gains which may cause damage or disgrace to the company (PE16)

2) Environmental conservation and development variables by utilizing the knowledge of science and technology (PE23)

3) The variable had a good attitude towards professional practice regardless of status, race, religion or political ideology (PE9).

4) The variables are responsible for the assigned work and are aware of the social and environmental responsibility in terms of welfare. Public Health and Safety (PE24)

5) The variable honors and respects the rights of scientists and technology both within and outside the organization (PE7).

6) The variables adhere to the dignity of being a scientist and technology and transfer it to the stakeholders of the organization (PE11).

DATA ANALYSIS

1. Qualitative Research is conducted by using In-depth Interview techniques, using Content Analysis, and summarized as a guideline for improving the competence of scientists to support the growth of industrial business sector according to the composition.

2.Quantitative Research analyzes general fundamental data with Descriptive Statistics, Inferential Statistic, and Multivariate Statistic with IBM SPSS (Statistical Package for the Social Science for Windows) and Structural Equations Modeling: SEM) will be analyzed with IBM SPSS AMOS (Analysis of Moment Structures for Research) program as follows.

2.1Data were analyzed by using descriptive statistics and check-list questionnaires by using frequency method and summed up as percentage for the estimation scale. Rating Scale was used to find Mean and Standard Deviation (S.D). The open-ended questionnaire used for content analysis and summarized as a frequency value.

2.2Inferential Statistics used by bivariate correlations analysis of the bivariate correlations of the Scientist Competency Development Guidelines to support the growth of the industrial sector with statistical significance at the levels of 0.001, 0.01 and 0.05. For testing the correlation between typical operating characteristics related to industrial science and technology management and business size, Pearson Chi-square analysis was determined for statistical significance at 0.05 level, and the difference approaches were tested to improve the competence of scientists to support the growth of the industrial sector classified by type of business size between the mean of the two population groups, 250 small and medium-sized

The Seybold Report
ISSN 1533-9211
DOI 10.5281/zenodo.6827381

factories and 250 large factories, both groups were independent sample test by t-test. The statistical significance was determined at the 0.05 level.

2.3Structural equation model analysis use Multivariate Statistic Analysis or development of Structural Equations Modeling (SEM) of approaches to develop the competence of scientists to support the growth of the industrial sector. Use the advanced statistical analysis program AMOS to obtain relevant statistical data together with the interpretation of the hypothesis testing of the research by assessing the conformity of the model (Evaluation the Data-Model Fit) and adjust the latent variables to be consistent with the empirical data according to the criteria, consider adjusting from Observed Variable, which is a variable from the question that has a 5-level rating scale that the researcher obtained from the actual data collection.

The researchers improved the model based on the Modification Indices: M.I., as recommended by Arbuckle, by considering the value of the program results and theoretical theory to exclude the observational variables that are inappropriate one by one and then perform a new model processing until the structural equation model is complete, consistent with the empirical data. Taking into account the criteria to be used in the assessment must be widely accepted and used. Arbuckle (2016) recommends four criteria for model evaluation that should be considered: 1) CMIN– p >0.05, 2) CMIN/DF <2, 3) GFI >0.90 and 4) RMSEA <0.08.

FINDINGS

1. To study the composition of the guidelines for the development of competence of scientists and technology to support the growth of the industrial business sector

The results of the analysis of the importance of the elements of the guidelines for the development of competence of scientists and technology to support the growth of the industrial business sector found that the overall importance was at the highest level with an average of 4.51,Standard Deviation was 0.26 and when considering by each component, it was found that the aspect that was most important was the skill transformation aspect, with an average of 4.63,Standard Deviation was 0.24 and professional ethics has an average of 4.57, Standard Deviation was 0.37 and the aspect that was of high importance was the new knowledge area. The mean is 4.47, Standard Deviation is 0.30 and the aspect of creativity to innovation, mean is 4.37, Standard Deviation is 0.30.

2. To develop a structural equation model, guidelines for the development of competence of scientists and technology to support the growth of the industrial business sector.

The results of the analysis of structural equation modeling guidelines for the development of competence of scientists and technology to support the growth of the industrial business sector revealed that Chi-Square Probability Level was 0.102. The correlation factor (CMIN/DF) was 1.111, the conformance index (GFI) was 0.954, and the mean square root index of estimation error (RMSEA) was 0.015. All four values passed. Assessment of conformity with empirical data As shown in Figure 2 and Figure 3.

ISSN 1533-9211

DOI 10.5281/zenodo.6827381

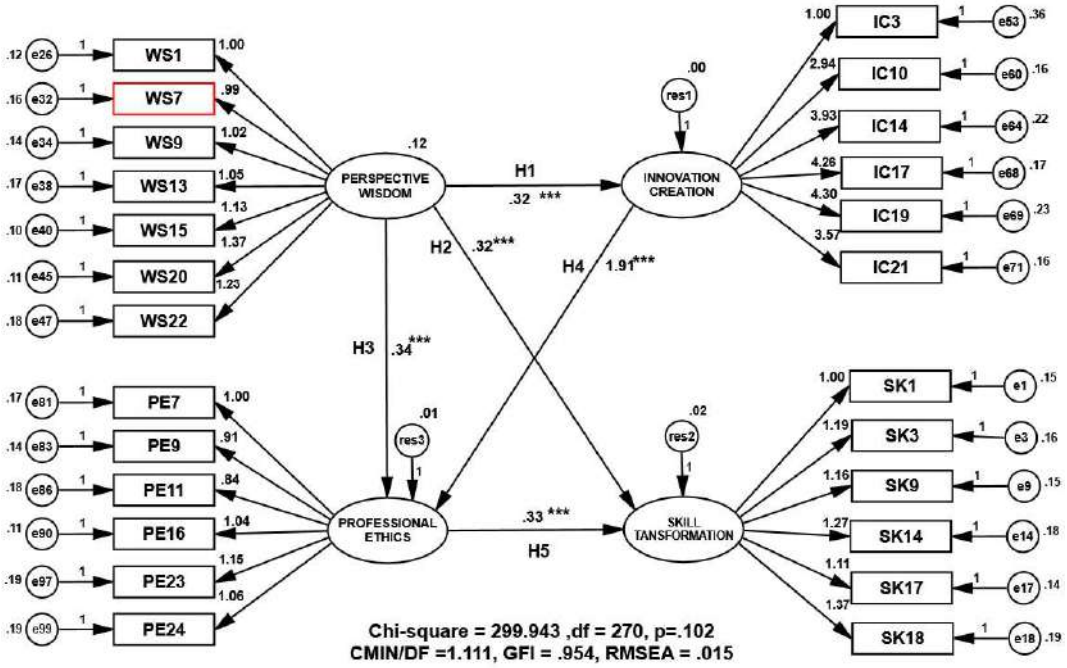

Figure 1: Structural Equation Model, Unstandardized Estimate mode after model improvement.

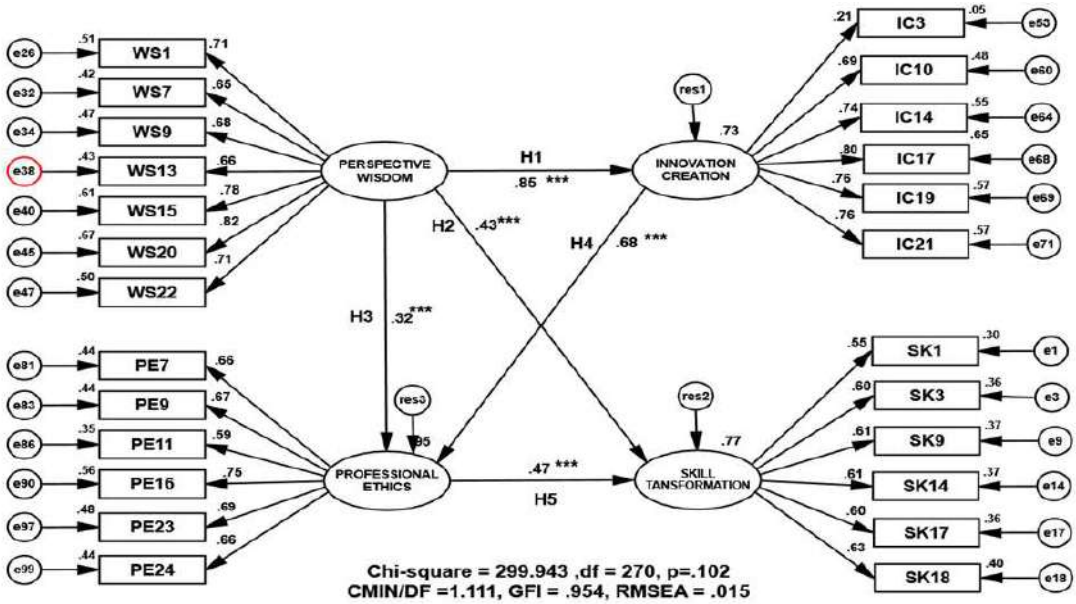

Figure2:Structural Equation Model, Standardized Estimate mode after model improvement.

The Seybold Report
ISSN 1533-9211
DOI 10.5281/zenodo.6827381

DISCUSSION

1.The results showed that the components that are important to the most promising approach for improving the competence of scientists and technology to support the growth of the industrial sector is the Skill Transformation component, in line with the findings of Dixit (2018) which found that on employee skill development: From the perspective of the organization, the employer has focused on building skills of the organization's human resources. It is the strategic role of the Human Resources Department that is responsible for linking human resources to the strategic goals and objectives of the organization as well as improving business results and developing an organizational culture that encourages innovation and competitive advantages in the organization

2.The variable with the highest mean, which was the creation of paths for growth and advancement in the careers of scientists and corporate technology, was consistent with the findings of Mannucci, Orazi, & de Valck (2021), which found that human resource development at the human level. It is a development that aims to allow personnel to experience and learn individually to provide human resources with knowledge and abilities and skills in the direction that the organization needs. This will enable personnel to work efficiently which leads to the advancement and career growth of corporate personnel. Haider, L.J., Hentati-Sundberg, J., Giusti, M. et al. (2018) found that the path of advancement for scientists has grown. In the profession, it is necessary to be developed through various methods such as training in order to achieve sustainability in the profession, it begins to develop from the moment you start working in the organization and continue to develop.

3.The results showed that Perspective Wisdom wasthe highest direct influence on Innovation Creation components at a weight of 0.86 with a statistically significant 0.001 level, consistent with the findings of Abdi et al. Effective knowledge. It will help the implementation of innovation strategic plans to be sustainable and creating new products which leads to competitive advantages.Kaabi, Elanain, & Ajmal (2018) found that HR knowledge sharing in organizations was positively correlated with perceived organizational innovation, and Wahyono (2020) found that the impact of knowledge management on innovation competitive advantage shows that the higher the knowledge management, the higher the competitive advantage will be. It also shows that knowledge management Product innovation will also be better.

4. The results showed that Perspective Wisdom was highest overall influence on Professional Ethic Component with0.90 weighted value is consistent with the findings of Islam, Ahmad, Kaleem, & Mahmood (2020) which found that the creation and sharing of HR knowledge within the organization through the Learning Goal Orientation method resulted in ethical issues. The work of human resources is reduced, therefore knowledge affects work ethics and in line with the results of a study by Zeb, Abdullah, Hussain, & Safi. (2020), knowledge creation and knowledge-sharing of HR within an organization result in an atmosphere of trust. Sincerity within the organization is considered to promote the ethics of human resources in the organization as well.

The Seybold Report
ISSN 1533-9211
DOI 10.5281/zenodo.6827381

5. From research results, when comparing the size of small and medium-sized businesses with large businesses in overall and in each aspect, there was no statistically significant difference at the 0.05 level. The organization's policies, objectives and strategies are general principles of human resource management through a variety of methods such as training, further education, sending personnel to see both domestic and international work. The use of external consulting services, which all methods depend on organizational policy factors, executive concept ,Competitive advantages and budget requirements, which are in line with the results of a study of SuneeWattanakomol (2017), a study of the Structural Equation Model of the Guidelines for Corruption Prevention in Industrial Business Organizations Prevention of corruption in industrial enterprises The aspect of cultivating morality is that executives must be a role model for morality and ethics. In terms of internal control, there is a step-by-step audit and approval process. The aspect of internal auditing is that internal auditors must not have conflicts of interest, the organization's guidelines that want to create transparency, and the penalties include stipulating clear penalties for fraudsters. For the hypothesis testing results, it was found that SMEs did not differ significantly in anti-fraud guidelines at the 0.05 level, and this was consistent with the ideas of Chursin and Tyulin (2018)mentioned in the academic textbook titled Competence Management and Competitive Product Development, stating that the fundamental factors and resources of the organization that differentiate the competence development of personnel are financial resources, capital, method Management and equipment, etc. The differences in performance development approaches are related to the state of resource factors within the organization, independent of the size of the different businesses. Therefore, in the development of scientific and technological competence of business and industry, whether small and medium-sized enterprises or large enterprises, there will be no different approaches for developing scientists and technology competencies.

NEW KNOWLEDGE

Based on the results of analysis and recommendations on the development of scientific and technological competences to support the growth of the industrial sector Gain new knowledge in the form of "SI2P" consists of four components of competency of scientists and technology to support the growth of the industrial sector. Elements of Creativity to Innovation new knowledge element and components of professional ethics as seen in Figure 3.

ISSN 1533-9211

DOI 10.5281/zenodo.6827381

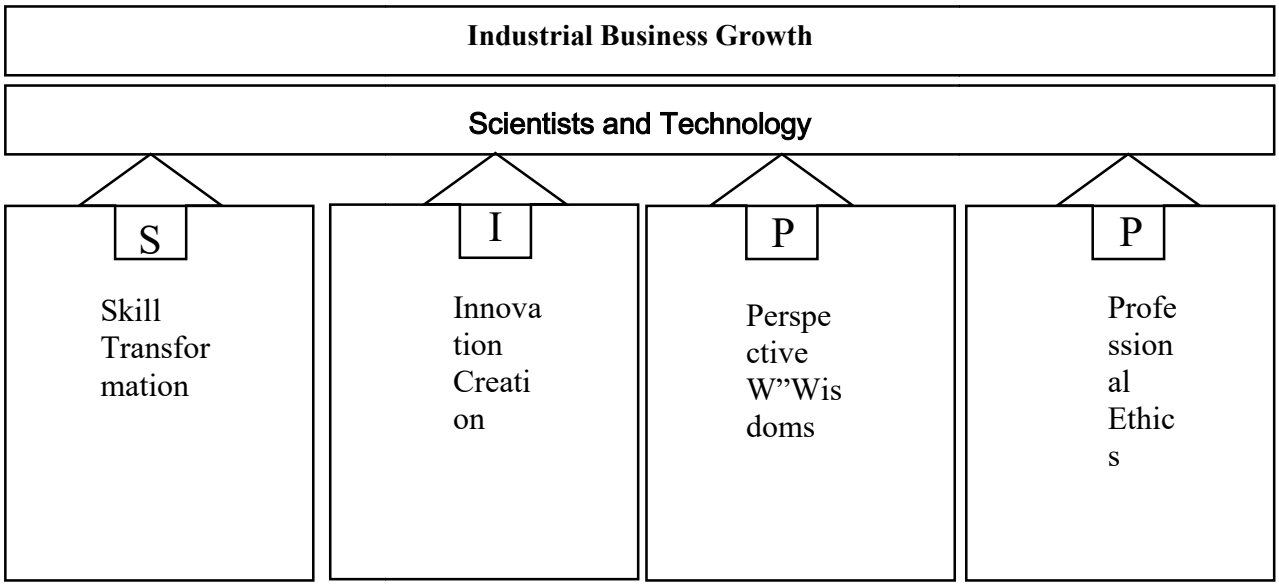

Figure 3: SI2P Model

Based on research findings on guidelines for developing the competence of scientists and technology to support the growth of the industrial business sector, the researcher has suggested guidelines for improving the competence of scientists and technology to support the growth of the industrial business sector as follows:

1. **Policy Level**

1.1The Ministry of Social Development and Human Security should formulate plans to promote and support funding or organize activities to promote knowledge, skills, science and technology resources for industrial agencies to create commercial innovation.

1.2The National Science and Technology Development Agency (NSTDA) should consider ethical requirements covering the performance of duties of scientists and technology to have clear guidelines in addition to research ethics.

1.3 Ministry of Industry should consider formulating the Scientist and Technology Skills Development Policy for Industry Plan 5.0 by increasing the issue of digital skills and knowledge for the development of the Thai industrial sector.

1.4 The Ministry of Higher Education, Science, Research and Innovation (TSU) should assign higher education institutions to determine the competence of students at all levels of education in the field of science and technology according to the components obtained from this study.

1.5 The Department of Intellectual Property should cooperate (MOU) with foreign educational institutions with excellence in science and technology by establishing an International Technology and Innovation Promotion Center to promote scientists and

The Seybold Report
ISSN 1533-9211
DOI 10.5281/zenodo.6827381

technology and entrepreneurs towards connecting innovations to the industrial business sector.

2.Operation Level

2.1 Industrial businesses formulate policies to promote and support studies and research on science and technology such as technology studies in agricultural plant breeding development or economic species.

2.2 Industrial business prepares a plan to develop people to have knowledge Science and Technology Capabilities by producing scientists that are in line with the needs of the country and indicators of the country's capability.

2.3 Industrial businesses should make an agreement and cooperate with government agencies and communities to receive the development of competence in scientists and technology by focusing on quantitative and qualitative outcomes that will occur to organizations and communities.

2.4 Industrial business by human resource management, career path plans should be formulated, which determines the performance indicators of human resources in science and technology positions in line with the vision corporate policy and corporate strategy**.**

3. Recommendation for future research

3.1 Study other elements to build on the knowledge of competency development of scientists and technology, such as lifelong learning, internal communication ethnic differences, etc.

3.2 Study other variables more to be applied to other types of organizations more comprehensively, such as the manufacturing industry and the service industry.

3.3 The structural equation model developed from this study should be put into practice with the organization by means of Research and Development and Action Research.

3.4 Extension of knowledge from this study by means of media (Intervention) to measure the efficiency and effectiveness of the model, such as the Scientist and Technology Competency Development Plan. or personnel training plans.

3.5 Psychometric standardization of measurement tools by developing from EFA component analysis and CFA component confirmation to a set of standard tools to be useful in measuring scientific and technological competence in the future.

Reference

Abdi, K., Mardani, A., Senin, A. A., Tupenaite, L., Naimaviciene, J., Kanapeckiene, L., &Kutut, V. (2018). The effect of knowledge management, organizational culture and organizational learning on innovation in automotive industry. Journal of business economics and management, 19(1), 1-19.

Arbuckle, J. L. (2016). IBM® SPSS® Amos™ user's guide. SmallWaters: Chicago, IL, USA.

Brown, L. S. (2018). Soft skill development in the higher education curriculum: A case study. IUP Journal of Soft Skills, 12(4), 7-29.

The Seybold Report
ISSN 1533-9211
DOI 10.5281/zenodo.6827381

Chenoy, D., Ghosh, S. M., & Shukla, S. K. (2019). Skill development for accelerating themanufacturing sector: the role of 'new-age'skills for 'Make in India'. International Journal of Training Research, 17(sup1), 112-130.

Chursin, A., &Tyulin, A. (2018). Competence Management and Competitive Product Development. Germany: Springer.

Dixit, U. (2018). Strategic role of human resource management in employee skill development: An employer's perspective. The Social ION, 7(2), 85-92.

Gilbert, P., Bobadilla, N., Gastaldi, L., Le Boulaire, M., &Lelebina, O. (2018). Management de larecherche et de l'innovation. ISTE Group.

Giraud, L., Bernard, A., &Trinchera, L. (2019). Early career values and individual factors of objective career success: the case of the French business graduates. Career Development International.

Goldhaber, D., Krieg, J., & Theobald, R. (2020). Effective like me? Does having a more productive mentor improve the productivity of mentees?. Labour Economics, 63, 101792.

Enmozhi, S. K., Raja, K., Sebastine, I., & Joseph, J. (2021). Andrographolide as a potential inhibitor of SARS-CoV-2 main protease: an in silico approach. Journal of Biomolecular Structure and Dynamics, 39(9), 3092-3098.

Haider, L. J., Hentati-Sundberg, J., Giusti, M., Goodness, J., Hamann, M., Masterson, V. A., ... &Sinare, H. (2018). The undisciplinary journey: early-career perspectives in sustainability science. Sustainability science, 13(1), 191-204.

IMD World Center. (2021). [ONLINE]. IMD World Competitiveness Yearbook (20*21*) THAILAND. Restive from https://www.imd.org › countries-landing-page

Islam, T., Ahmad, S., Kaleem, A., & Mahmood, K. (2020). Abusive supervision and knowledge sharing: moderating roles of Islamic work ethic and learning goal orientation. Management Decision.

Jeske, D., & Linehan, C. (2020). Mentoring and skill development in e-internships. Journal of Work-Applied Management.

Kaabi, A. A. A., Elanain, H. A., & Ajmal, M. M. (2018). HRM practices and innovation performance with the mediating effect of knowledge sharing: Empirical evidence from Emirati ICT companies. International Journal of Innovation and Learning, 24(1), 41-61.

Kampkötter, P., Harbring, C., &Sliwka, D. (2018). Job rotation and employee performance–evidence from a longitudinal study in the financial services industry. The International Journal of Human Resource Management, 29(10), 1709-1735.

Kulkarni, P., Mutkekar, R., &Ingalagi, S. (2020). Role of strategic management for employee engagement and skill development for start-ups. Vilakshan-XIMB Journal of Management.

Leedy, P. D., & Ormrod, J. E. (2019). Practical research: Planning and design. Pearson. One Lake Street, Upper Saddle River, New Jersey 07458.

Mannucci, P. V., Orazi, D. C., & de Valck, K. (2021). Developing improvisation skills: The influence of individual orientations. Administrative Science Quarterly, 66(3), 612-658.

National Innovation Agency. (2022). [Online]. Global Innovation Index (GII 2021). [Retrieved January 29, 2022]. From https://regional.nia.or.th/th/content/category/detail/id/10/iid/59.

The Seybold Report
ISSN 1533-9211
DOI 10.5281/zenodo.6827381

Noe, R. A., Hollenbeck, J. R., & Gerhart, B. A. (2021). Fundamentals of human resource management. McGraw Hill.

Park, Y., Lim, D. H., & Lee, J. (2021). Moderating effect of career planning on job support and motivational process of training transfer. European Journal of Training and Development.

Rojewski, J. W., & Hill, R. B. (2017). A framework for 21st-century career-technical and workforce education curricula. Peabody Journal of Education, 92(2), 180-191.

Santiteerakul, S., Sopadang, A., &Sekhari, A. (2019). Skill Development for Industrial Engineer in Industry 4.0. In Proceedings of IEEE—15th China-Europe International Symposium on Software Engineering Education.

Silcharu, T. (2020). Stratistical Research and Analsis with SPSS and AMOS. 18th edition. Bangkok: Business R&D General Partnership.

Singh, S., & Kaur, K. (2018). A Study on Skill Development of Paint and Coating Industry. Kurukshetra University, Kurukshetra–Haryana, 5, 2348-1269.

SomkidBangmo. (2008). Business ethics. 3rd printing, Bangkok :Phatthanawit Printing

Terblanche, N. (2021). Coaching techniques for sustained individual change during career transitions. Human Resource Development Quarterly, 32(1), 11-33.

Wahyono, W. (2020). The mediating effects of product innovation in relation between knowledge management and competitive advantage. Journal of Management Development.

Wantanakomol, S. and Silpcharu, T."Strategy for Preventing Corruptions in Industrial Business Organizations with Delphi Technique".Academy of Strategic Management Journal. Vol.20 No.3 (June 2020)

Van Laar, E., Van Deursen, A. J., van Dijk, J. A., & De Haan, J. (2019). Determinants of 21st-century digital skills: A large-scale survey among working professionals. Computers in human behavior, 100, 93-104.

Zeb, A., Abdullah, N. H., Hussain, A., & Safi, A. (2020). Authentic leadership, knowledge sharing, and employees' creativity. Management Research Review.